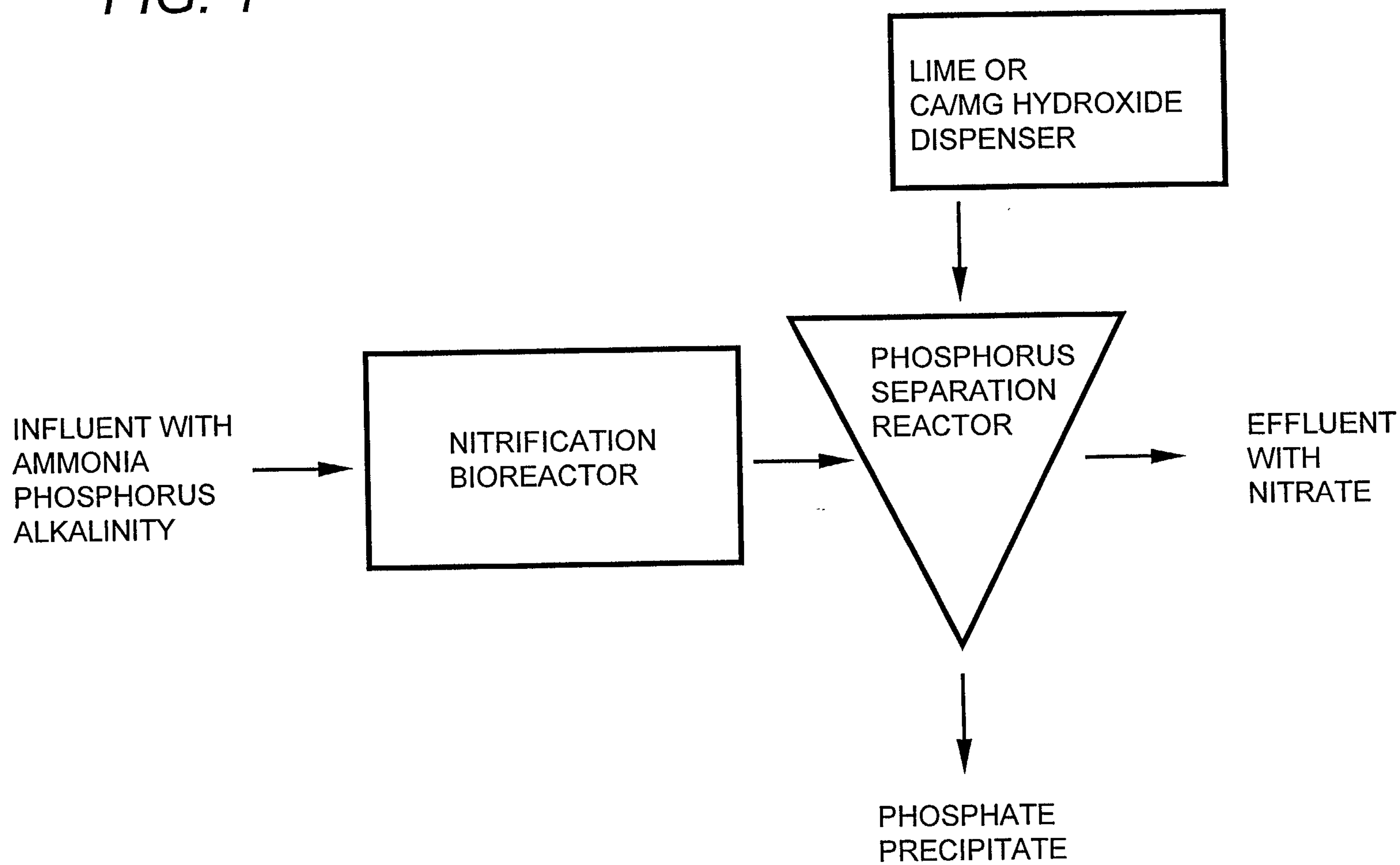
FIG. 1


LIME OR
CA/MG HYDROXIDE
DISPENSER
INFLUENT WITH
AMMONIA
PHOSPHORUS
ALKALINITY
NITRIFICATION
BIOREACTOR
PHOSPHORUS
SEPARATION
REACTOR
EFFLUENT
WITH
NITRATE
PHOSPHATE
PRECIPITATE

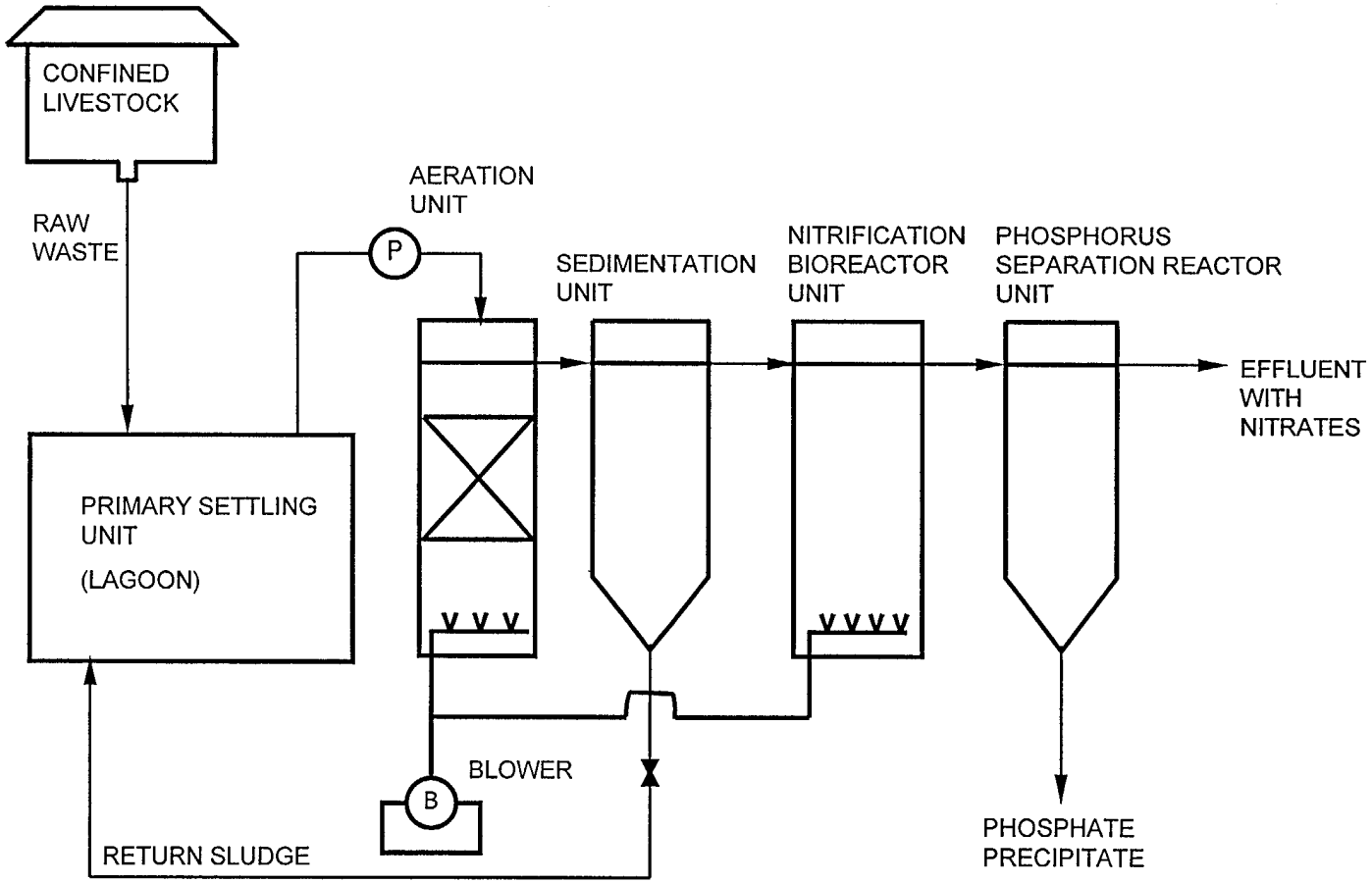
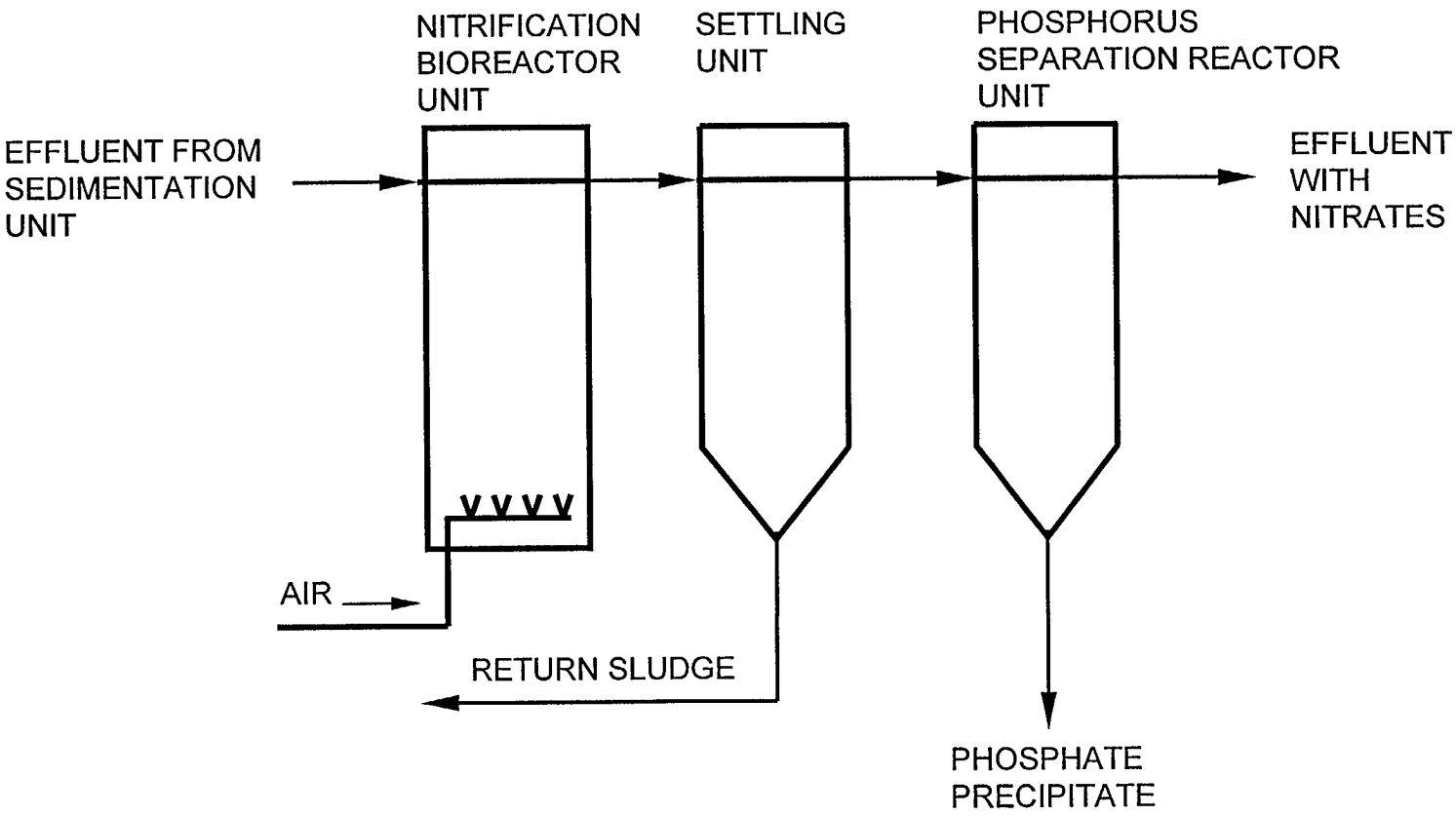


FIG. 2

FIG. 3


NITRIFICATION BIOREACTOR UNIT
SETTLING UNIT
PHOSPHORUS SEPARATION REACTOR UNIT
EFFLUENT FROM SEDIMENTATION UNIT
EFFLUENT WITH NITRATES
AIR
RETURN SLUDGE
PHOSPHATE PRECIPITATE

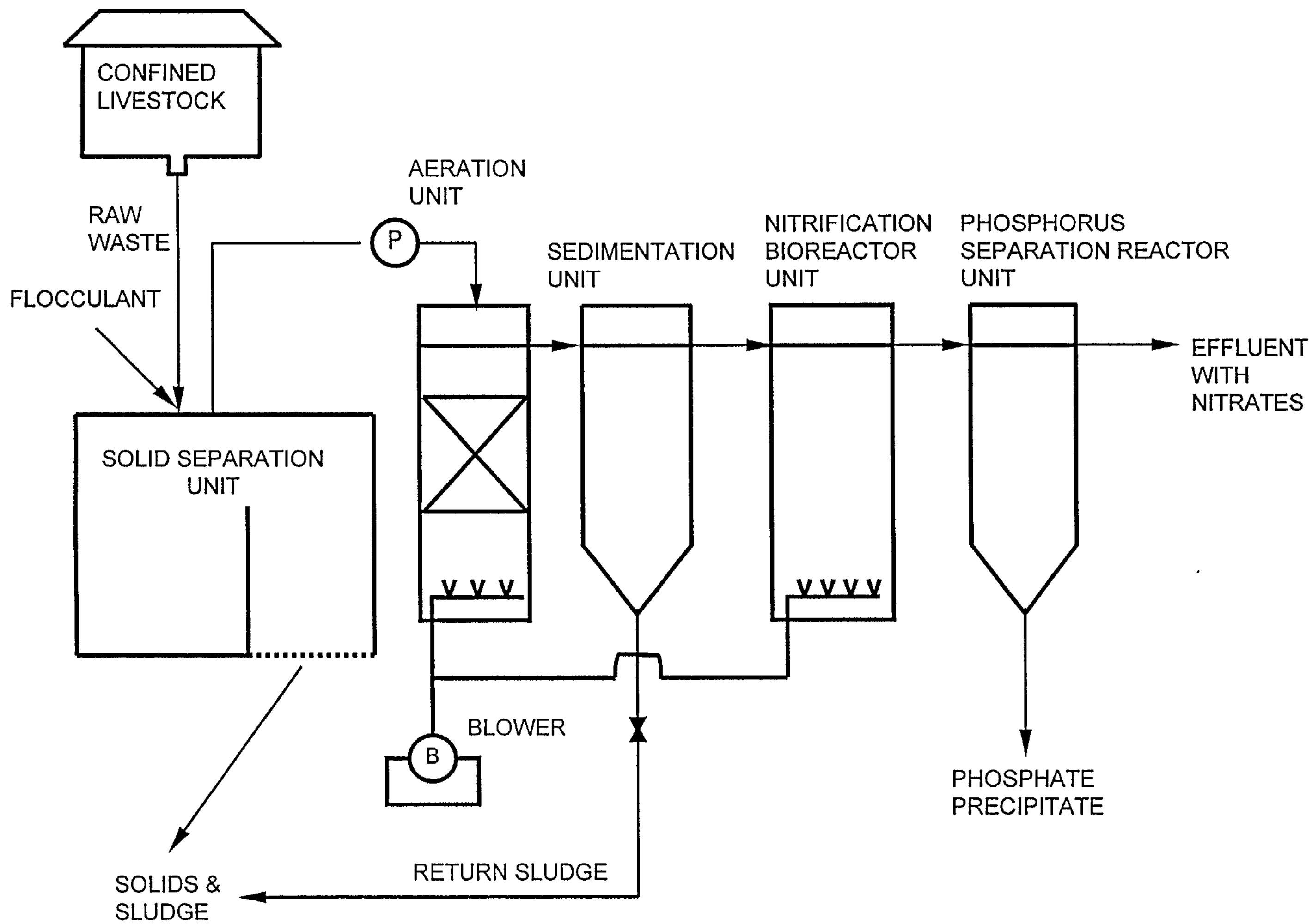

CONFINED LIVESTOCK
RAW WASTE
FLOCCULANT
SOLID SEPARATION UNIT
AERATION UNIT
P
SEDIMENTATION UNIT
NITRIFICATION BIOREACTOR UNIT
PHOSPHORUS SEPARATION REACTOR UNIT
EFFLUENT WITH NITRATES
BLOWER
B
PHOSPHATE PRECIPITATE
RETURN SLUDGE
SOLIDS & SLUDGE

FIG. 4

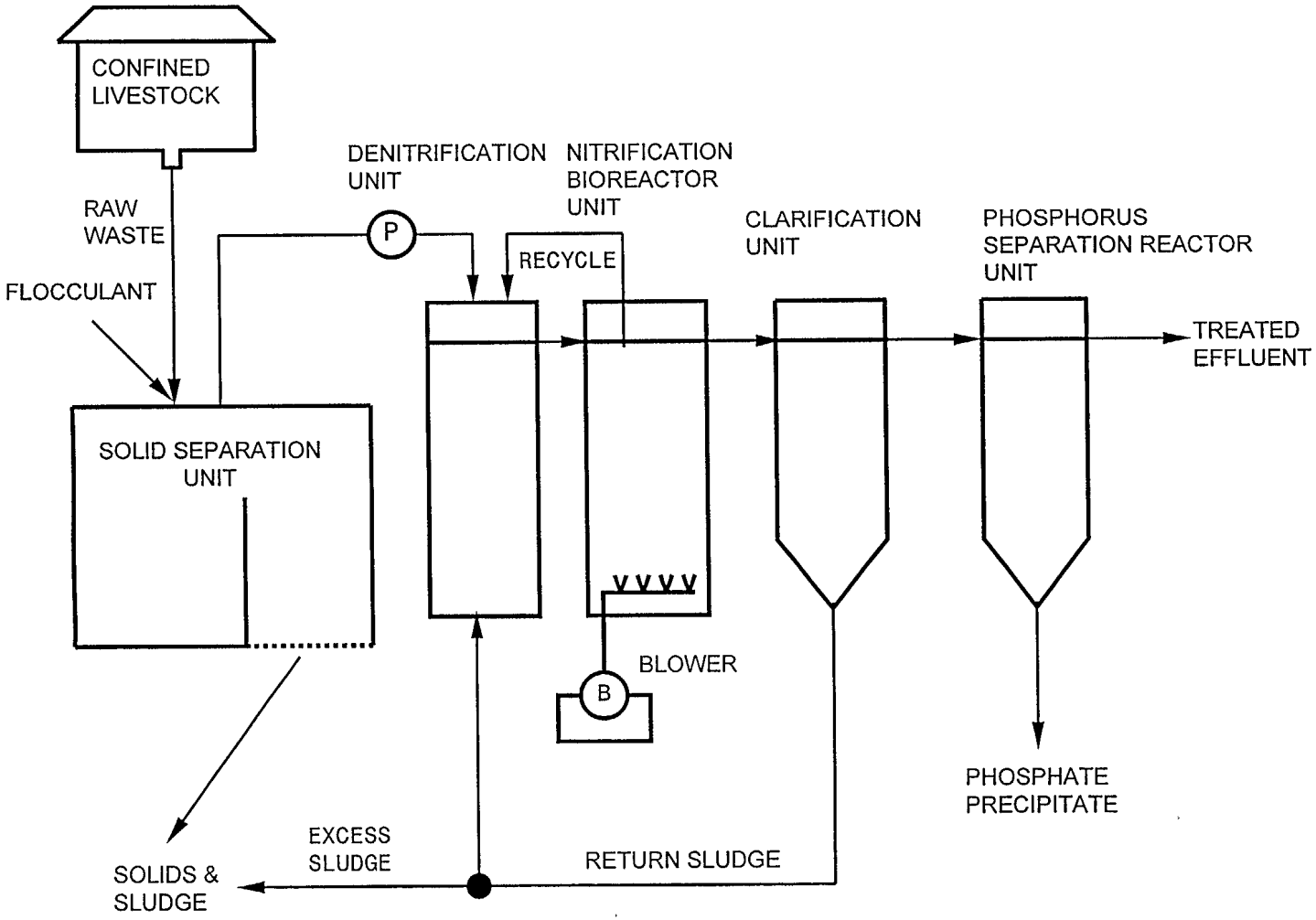
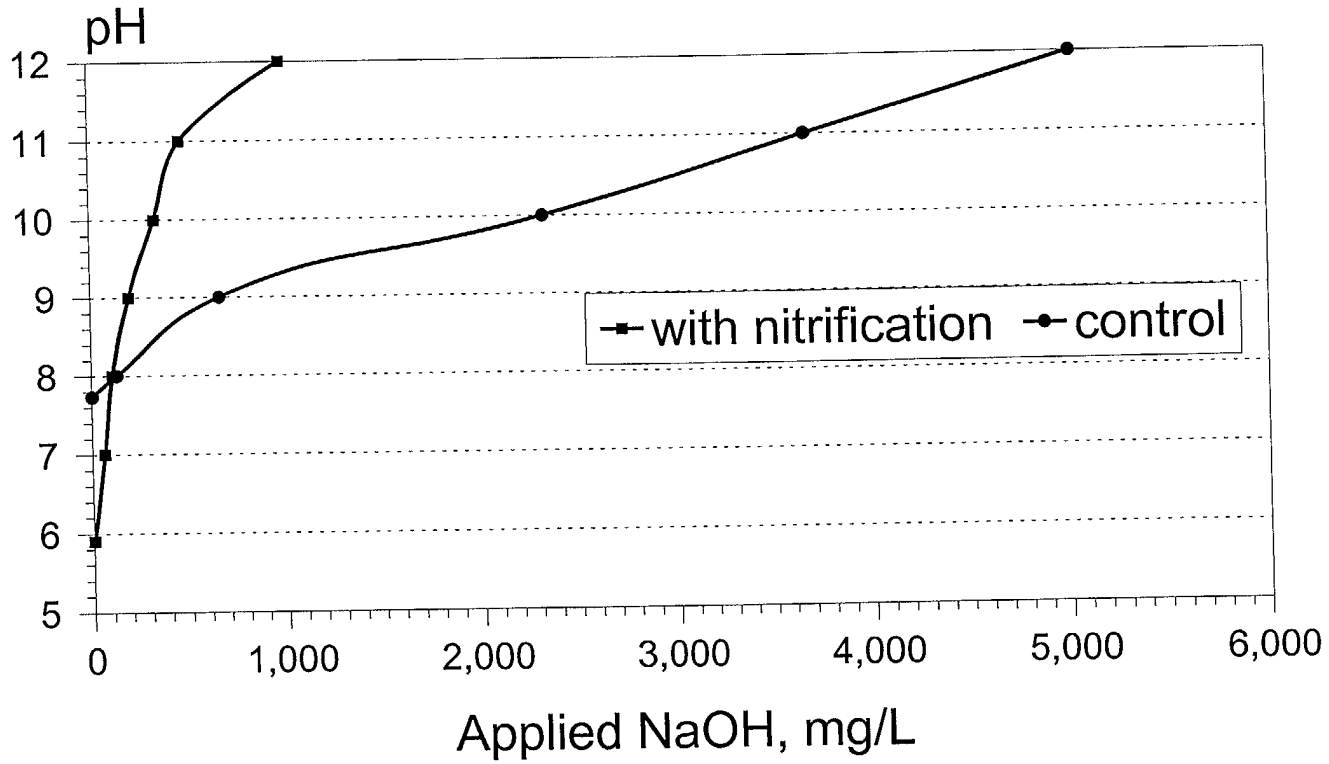


FIG. 5

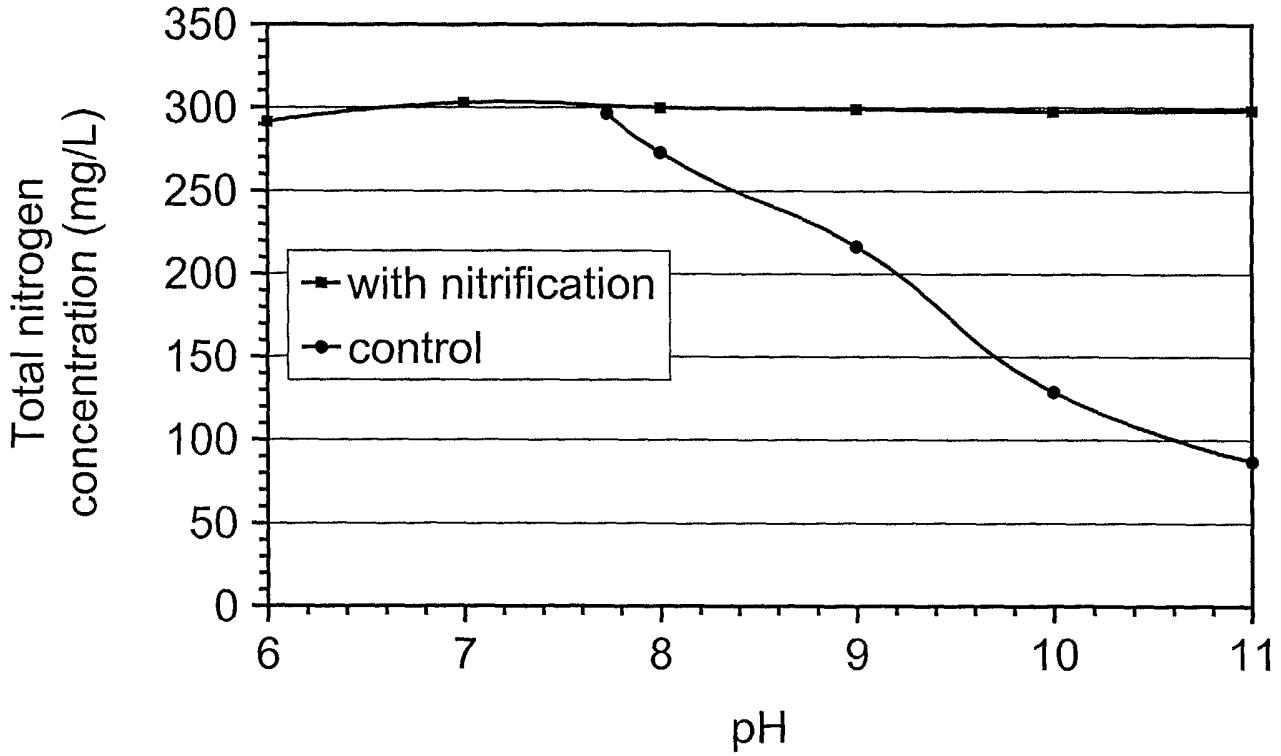


EFFECT OF ALKALI ADDITION ON pH OF SWINE WASTEWATER THAT RECEIVED NITRIFICATION PRETREATMENT VS. CONTROL

FIG. 6

Nitrogen losses in swine wastewater
by ammonia volatilization

FIG. 7



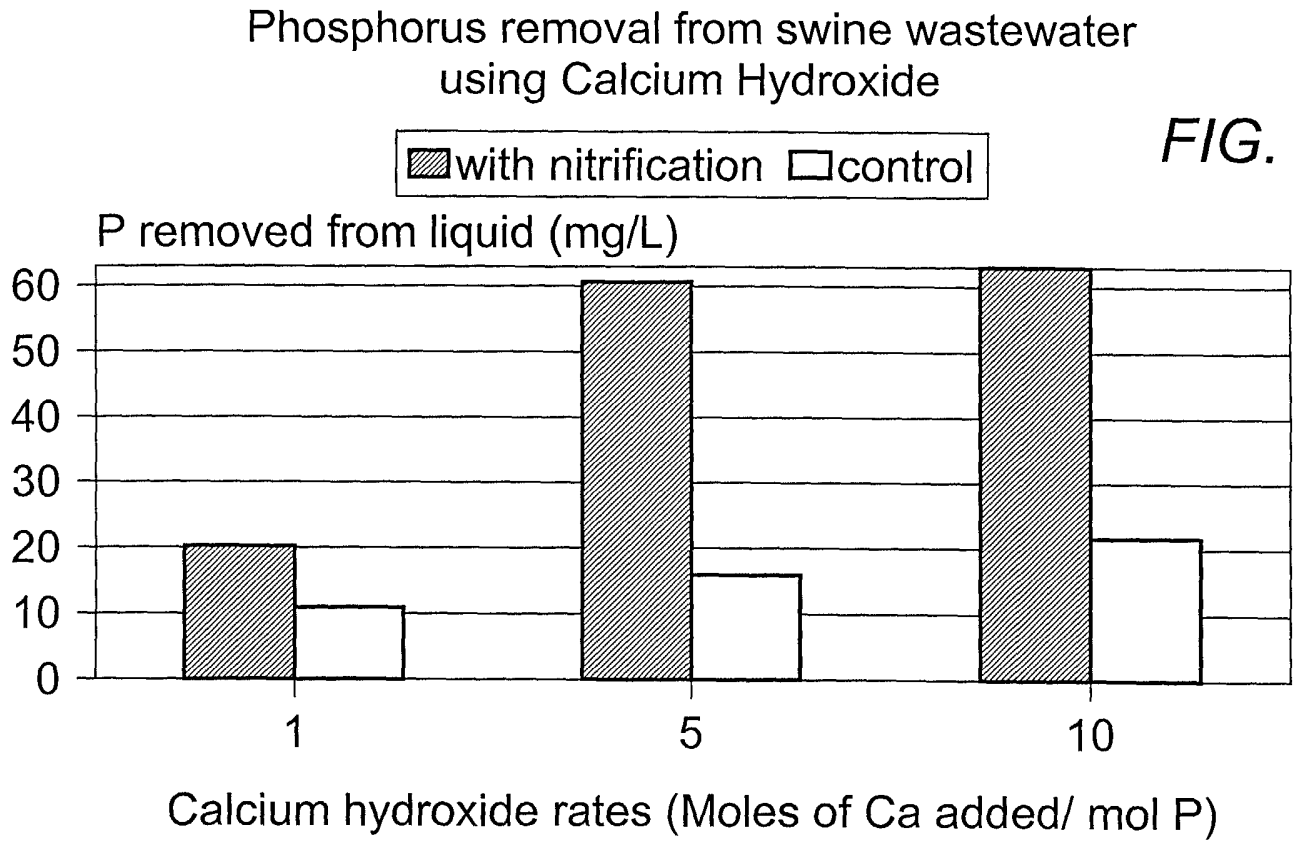


FIG. 8

Initial conditions:
PO_4-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH_4-N=300 mg/L
After nitrification:
PO_4-P= 63 mg/L, pH= 6.06, alkalinity=63 mg/L, NH_4-N=61 mg/L

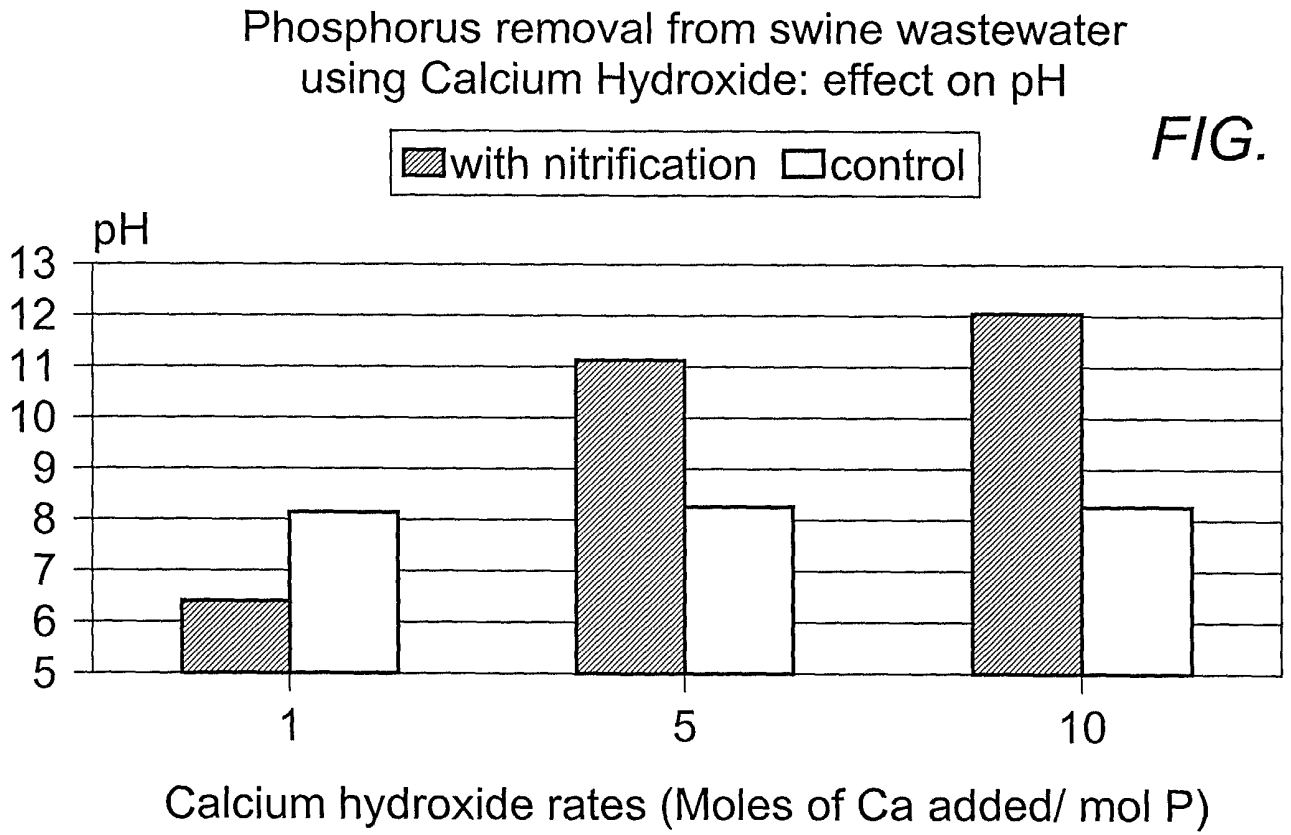
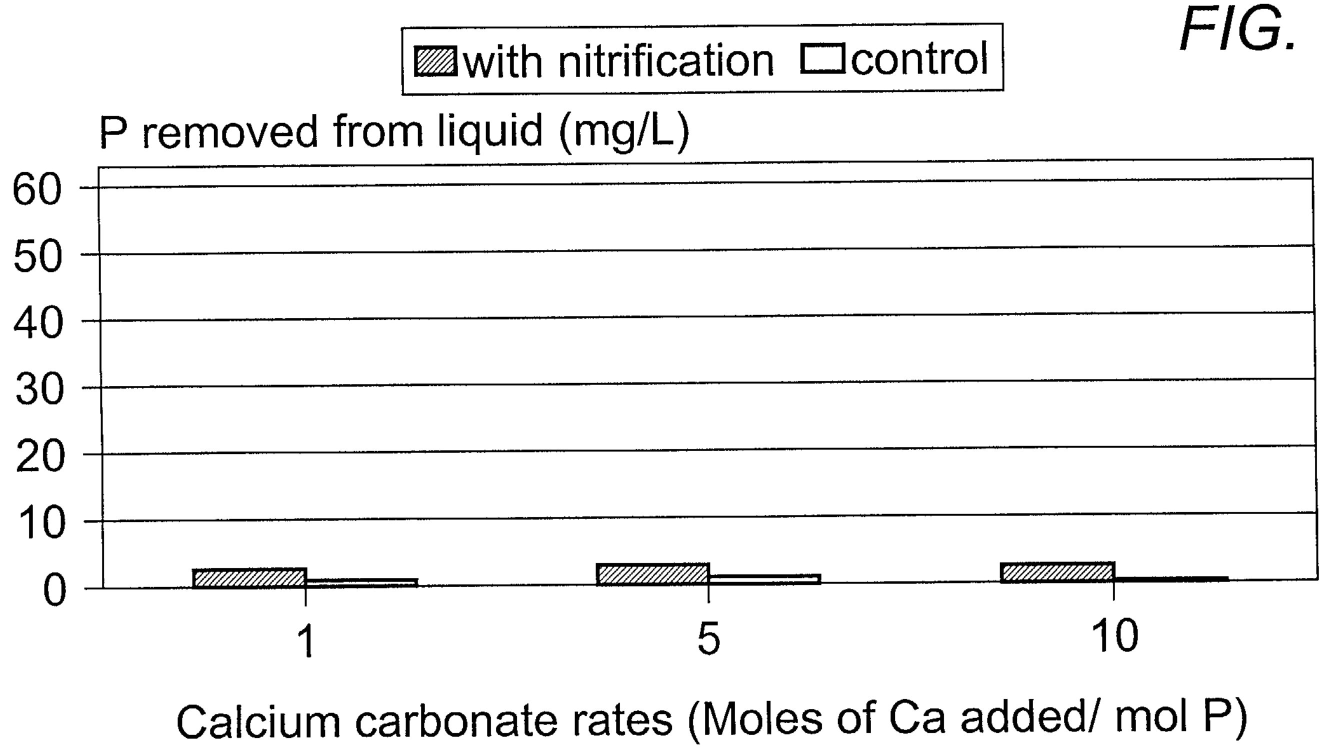


FIG. 9

Initial conditions:
PO_4-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH_4-N=300 mg/L
After nitrification:
PO_4-P= 63 mg/L, pH= 6.06, alkalinity=63 mg/L, NH_4-N=61 mg/L

Use of Calcium Carbonate Lime was not effective for removal of phosphorus from swine wastewater

FIG. 10



<u>Initial conditions</u>:

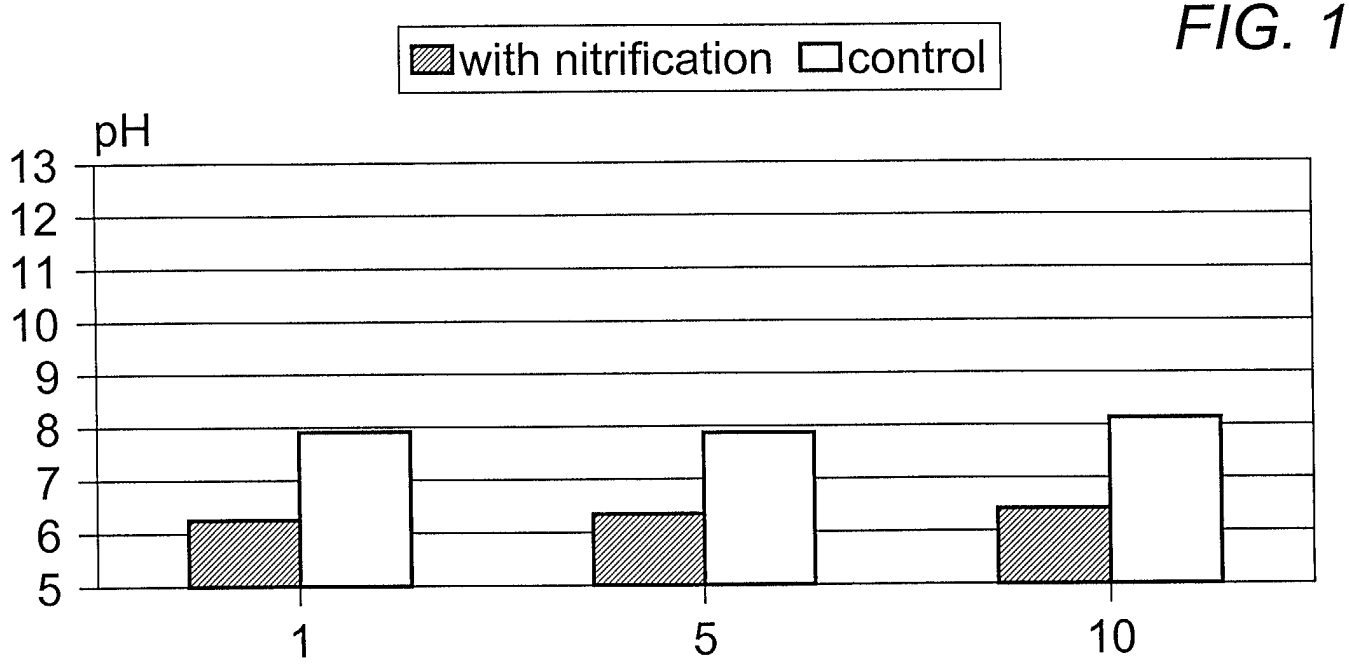
PO_4-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH_4-N=300 mg/L

<u>After nitrification</u>:

PO_4-P= 63 mg/L, pH= 6.06, alkalinity=63 mg/L, NH_4-N=61 mg/L

Application of Carbonate lime to swine wastewater did not affect pH or phosphorus removal.

FIG. 11



Initial conditions:
PO_4-P= 63 mg/L, pH= 8.05, alkalinity=1890 mg/L, NH_4-N=300 mg/L
After nitrification:
PO_4-P= 63 mg/L, pH= 6.06, alkalinity=63 mg/L, NH_4-N=61 mg/L